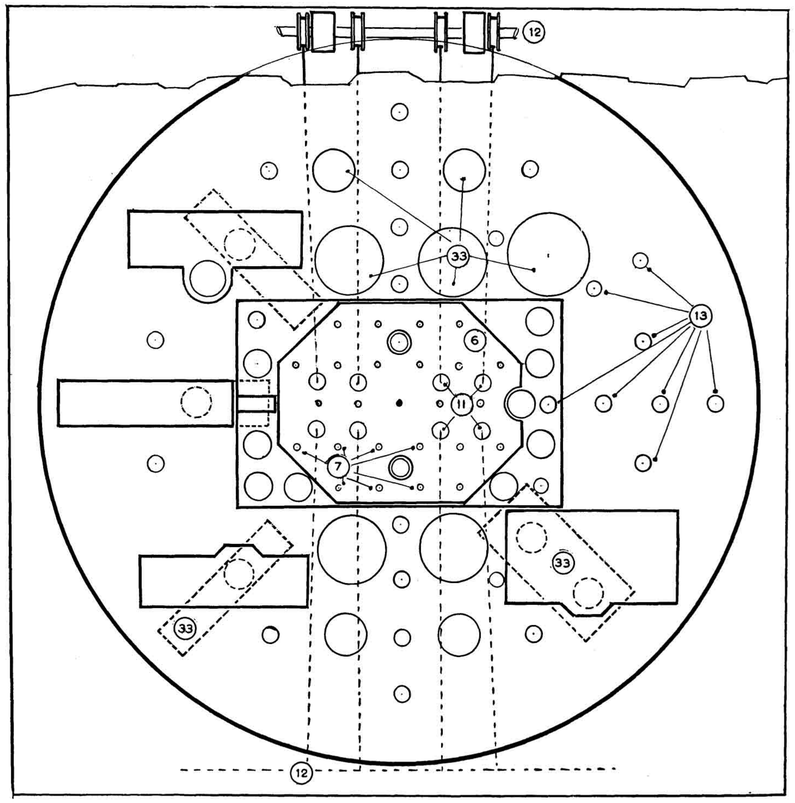
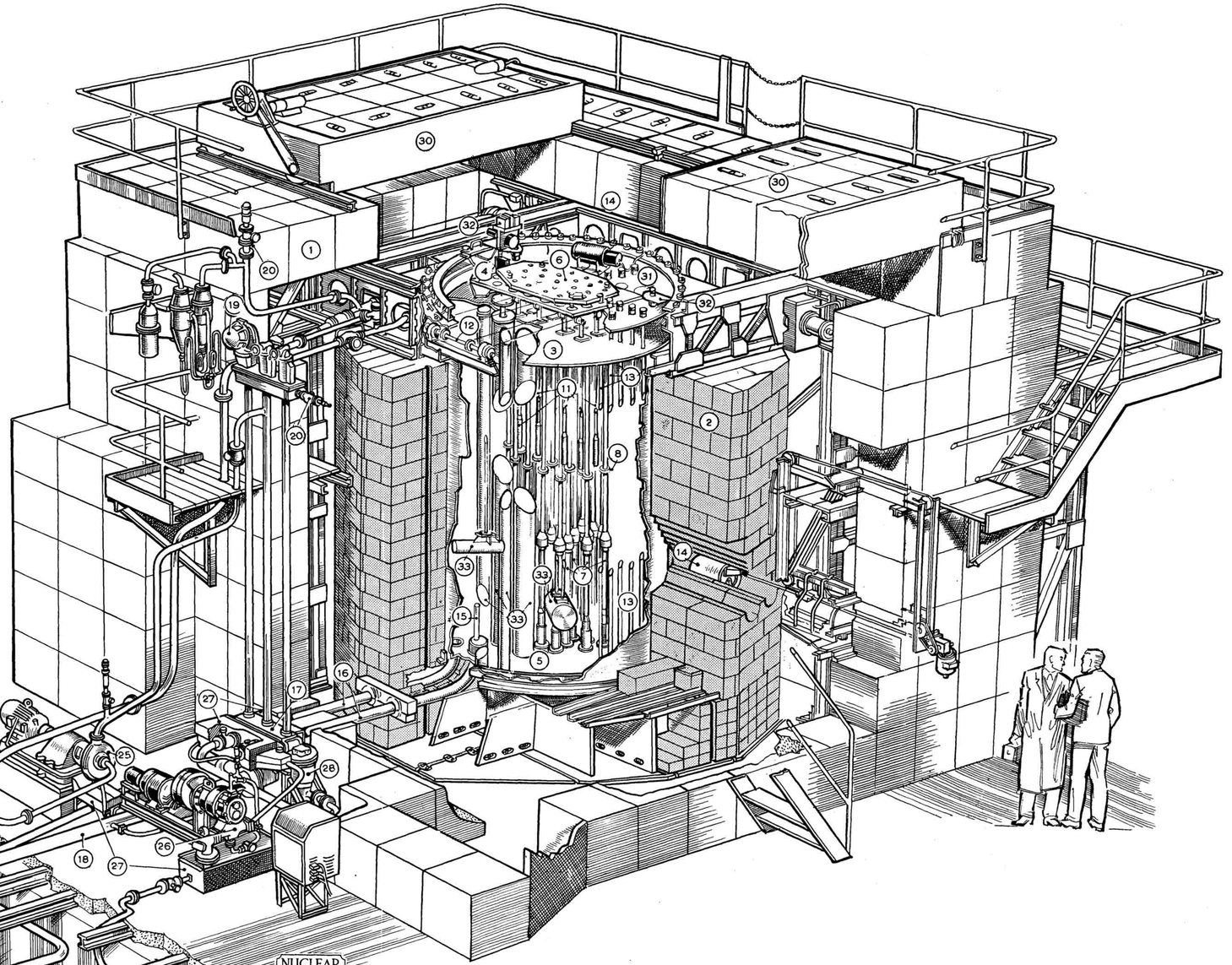
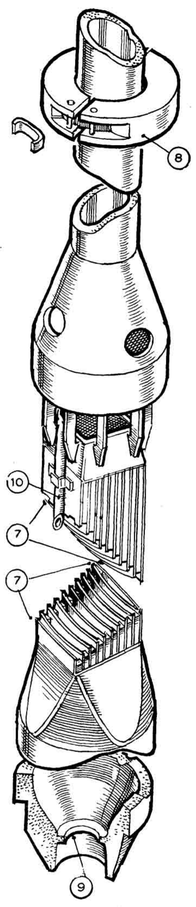
The World's Reactors
No. 4 — DIMPLE



Above—Plan of top face of the reactor with biological shield removed. The safety bridge secured by padlock and interlock catch prevents modification of the lattice except during shut-down. Fuel element assemblies are seen terminating in set screws. Dispositions of simulating voids and search channels are indicated.



Right—Cut-away view of the reactor showing DIDO core under test. Lattice is surrounded by voids and absorbers to simulate experimental holes and is provided with additional negative reactivity in the control system. D_2O circuit is shown with freezer-drier unit for heavy water reclamation prior to a lattice change.



Left—Fuel element assembly. Individual plates are made from vacuum cast ingots of U-Al alloy which are rolled to thickness and then clad in Al and rolled to size and shape. Individual plates are soldered together with Al spacers to form box units. Cooling is by natural circulation.

KEY

1. Biological Shield.
2. Graphite Reflector.
3. Top Lattice Plate.
4. Location Lattice Plate.
5. Bottom Lattice Plate.
6. Safety Bridge.
7. Fuel Element Plate(s).
8. Fuel Rod Extension Clamp.
9. Fuel Rod Water Throttle.
10. Fuel Rod Fission Chamber.
11. Shut-off Rods.
12. Shut-off Rods Wind-gear.
13. Search Tubes.
14. Ion Chamber.
15. Partial Dump Stand Pipe.
16. Dump Lines.
17. Dump Valves.
18. Main Dump Line.
19. D_2O Level Transmitter.
20. Drying Connection.
21. Balance Line.
22. Dump Tanks.
23. Dump Tank Balance Line.
24. Primary Pump.
25. Transfer Pump.
26. Control Pump.
27. Leak Shrouds.
28. Control Dump Valve.
29. D_2O Leak Tank.
30. Travelling Top Shield.
31. Removable Tank Top.
32. Herriott Probe.
33. Voids.

The World's Reactors No. 4

DIMPLE — DEUTERIUM MODERATED PILE, LOW ENERGY

TYPE:	Thermal heterogeneous.
PURPOSE:	Versatile zero energy facility. Lattice testing and oscillator experiments.
LOCATION:	A.E.R.E., Harwell, England.
OPERATION:	Commenced operation July 26, 1954.
FUEL:	Variable. for DIDO, Enriched uranium alloy. Alloy: Uranium-aluminium, aluminium clad. Plateform: 23.6 in. x 2.36 in. x 0.036 in. Curvature: on radius $5\frac{1}{2}$ in. Assembly: 2.9 in. sq. approx., 9 plates per box.
CLADDING:	Aluminium: S 1 C. Treatment: Al sheet, welded on three sides, rolled.
MODERATOR:	Heavy water—total investment 15 tonnes. Quantity variable—depending on experiment.
CORE:	Variable. Reactor tank 8.5 ft. diameter x 10 ft. high. for DIDO: 34 in. x 28 in. x 24 in. high. Lattice: basically square, central row displaced, 6 in. pitch. Number of fuel elements: 25.
REFLECTOR:	Graphite. Radial thickness: 33 inches approx. Design allows for variation if required.
COOLANT:	Heavy water. Natural convection in moderator.
FLUX:	Maximum thermal neutron flux: 3×10^{8} n/cm^2-sec. Corresponds to maximum power: 300 watts.
CONTROL:	Shut-off: in two banks, number variable. for DIDO: two banks of 4 each. Material: cadmium tubes, internal and external Al sheath, weighted with stainless steel. Coarse control: height of D_2O. Pump: variable speed and reversible gear pump.
SHIELDING:	Concrete. Thickness: 2 ft.
OVER-ALL SIZE:	22 ft. x 22 ft. x 18 ft. high.

The World's Reactors: No. 3 — NRX

ADDITIONAL DATA

Fuel charge for criticality	— 175 rods, a total of 10 tons.
Maximum fuel temperature	— 1,100°F, (600°C).
Fuel sheath temperature	— 260°F (130°C).
Thermal utilization factor	— 0.928.
Fast fission factor	— 1.036.
Resonance escape probability	— 0.909.